

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference P045230PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/NL 03/00431	International filing date (day/month/year) 13.06.2003	Priority date (day/month/year) 13.06.2002
International Patent Classification (IPC) or both national classification and IPC G01N27/447		
Applicant STICHTING VOOR DE TECHNISCHE WETENSCHAPPEN et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 13.01.2004	Date of completion of this report 24.09.2004
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Müller, T Telephone No. +49 89 2399-2285 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/NL 03/00431**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*):

Description, Pages

1, 2, 4-10 as originally filed
3, 3a received on 04.08.2004 with letter of 04.08.2004

Claims, Numbers

1-9 as originally filed

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-9
	No: Claims	
Inventive step (IS)	Yes: Claims	1-9
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

2. Citations and explanations

see separate sheet

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EXAMINATION REPORT - SEPARATE SHEET**

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Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: EP-A-0 475 713 (UNIV LELAND STANFORD JUNIOR) 18 March 1992

D2: GB-A-1 196 887 (PEKKA KIVALO; RAUNO ERKKI VIRTANEN) 1 July 1970

Technical field:

The application is related to a capillary electrophoresis device. In such a device a sample is separated by travelling at different speeds in a capillary tube through a medium under influence of an electric field applied to that medium via electrodes at the ends of the capillary tube channel.

Problem:

Preventing the electrical breakthrough between the electrodes of the separation unit and the detector.

Solution:

Device according to claim 1 wherein the voltage difference between the separation unit and the detection electrodes is reduced by a DC - voltage source.

Prior art:

Most relevant prior art documents are D1 and D2, cited as "X" - documents in the search report:

D1 relates to an electrophoresis apparatus (column 1, line 6) with a liquid filled capillary (100), electrodes (160,170) and a power supply (430, 110), see figure 1 and column 3, lines 33-56. D1 further mentions the problem of preventing the high separation potentials used from interfering with the detection process and a potentiostat (570) connected via an electrochemical cell (410) to the high voltage DC power supply (430) (figures 4 and 5).

D2 discloses an electrophoresis apparatus wherein a compensation potential is applied via an adjustable resistor R.

Novelty (Article 33(2) PCT):

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The potentiostat according to D1 cannot be seen as a DC voltage source as claimed in claim 1 of the present application, because the potentiostat is the detection circuit. Furthermore, in D1 the detection electrode is positioned outside the end portion of the capillary column with the separation electrode, so that the potentiostat would produce an additional voltage difference instead of reducing it.

In D2, the resistor R is only provided in order to achieve a reference measurement signal and not in order to prevent electrical breakthrough between the separation system and the detection system.

Therefore the subject-matter of claim 1 is considered to be new over the available prior art.

Inventive step (Article 33(3) PCT):

The prior art documents D1 and D2 disclose technical features which are similar to the claimed DC - voltage source, but for different purposes in a configuration where it is not necessary to prevent an electrical breakthrough. Other prior art teaches isolation of the separation system from the detection system, see the page 3 of the description of the present application. As a consequence the subject-matter of present claim 1 meets the requirement of inventive step.

Claims 2-9 are dependent claims and meet also the requirements of the PCT.

Other known solutions attempt to solve the problem by isolating the separation system from the detection system, using for instance extra modules in order to pass on the detection signal to further process units without a DC-potential.

Another known solution is described in *Electronic protection methods for conductivity detectors in micro capillary electrophoresis devices*, by J. Bastemeijer et al, Sensors and Actuators B 83 (2002) 98 - 103, Elsevier. This document discloses a protection technique that uses a floating high voltage supply to generate an electrical field to the channel. The floating high voltage is biased in such a way that the DC level in the channel at the location of the detector should remain at about ground potential.

As a result of that, the object is that no potential difference is present between the channel and the detection apparatus, so the risk of electrical breakthrough is minimised. However, this system has the disadvantage that such floating high voltage supplies are not easy available. Also, it is difficult to establish a well-defined ground level at the location of the detector by using a floating high voltage supply and, therefore, the risk of electrical breakthrough remains.

SUMMARY OF THE INVENTION

The object of the present invention is to provide an electrophoretic system in which any current between the separation system and the detection system, and the risk of electrical breakthrough at the detection system is further reduced.

In order to obtain this object, the invention provides a system as defined in the outset, characterised in that the electrophoretic system comprises means to reduce a voltage difference between the separation system and the detection system in order to prevent electrical breakthrough between the separation system and the detection system, where said means to reduce said voltage difference comprise a DC-voltage source. This DC-voltage source is an easy to use device, that is also readily available. Such a system can establish a ground potential at the detection system in a well defined way. Moreover, because of the fact that the need for a floating high voltage supply is omitted, the system will be a much safer system to use and the systems integrity is ensured. Also, the fact that the separation voltage supply is grounded, simplifies the incorporation of the system with existing systems and reduces interface problems with the high voltage supply that would otherwise occur.